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March 6, 2002

TO: Internal File

THRU:  Susan M. White, Sr. Reclamation Specialist/Team Lead

FROM: Priscilla W. Burton, Sr. Reclamation Specialist/Soils

RE:  Upper Pad Reclamation Appendix 14, PacifiCorp, Des Bee Dove Mine,  
C015/017- AM01A-2

**SUMMARY:**

Phase I reclamation describes the reclamation of approximately 4 acres of pre-SMCRA disturbance at the Des Bee Dove Mine: the Little Dove/Beehive pad (2.13 acres), the substation and water storage area (0.75 acres) and the access road down to the Desert pad (0.97 acres). These plans supersede those in the currently approved MRP, Volume 2 for the salvage and redistribution of substitute topsoil.

Trenches were used to evaluate soils at the site for their reclamation potential. Trenches were dug during the first week of December. A response to the deficiencies of TA\_01A-1 (dated November 9, 2001) was received on December 20, 2001, but no additional information, plan or conclusions from the trenches was presented. The response was prepared prior to receiving the laboratory report for the trenching samples and was therefore incomplete.

I met with Energy West representatives and their consultant, Dan Larsen, on January 28, 2002, to discuss the laboratory analyses and recommendations gained from the trenching activity. On January 30, 2002, I provided unofficial comment on their proposal. A soils management plan was supplied to the Division on February 4, 2002, six weeks after the third revision of Phase I reclamation plan was received and six months after issuance of N.O.V. 01-7-1-1.

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Soil samples to date have shown that the best soil has a loamy texture (less than 55% sand), a pH of less than 7.6 and EC values of less than 2.0. Since the substitute topsoil will be only a surface layer of less than six inches and serve as a seedbed, it is imperative that SAR values are also kept low, less than 2.0. Low SAR values will also increase resistance to erosion (lower K factor).

Also important to remember samples of the coal refuse demonstrate that it is far less suitable for use in the rooting zone than other soils due to its texture (sand), organic carbon content (70 – 90%) and elevated SAR values.

**TECHNICAL ANALYSIS:**

**GENERAL CONTENTS**

**REPORTING OF TECHNICAL DATA**

Regulatory Reference: 30 CFR 777.13; R645-301-130.

**Analysis:**

Field work to collect soils from the Phase I and Phase II (AM01D) reclamation areas was conducted by Mr. Dan Larsen, Soil Scientist, EIS Environmental & Engineering Consulting, 31 North Main Street, Helper, Utah 84526, during the first week of December 2001. Soils were selected for analysis by Energy West personnel and analyzed by InterMountain Laboratories in Sheridan, Wyoming. Field and Laboratory reports are located in Appendix C of Chapter 2.

**Findings:**

Information in the proposed amendment is adequate to meet the technical reporting qualifications requirements of the Regulations.

## ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

### SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.21; 30 CFR 817.22; 30 CFR 817.200(c); 30 CFR 823; R645-301-220; R645-301-411.

#### Analysis:

Elevation is 7,800 feet on a south to southeast exposure and slopes of 1 ½ H:1V to 2H:1V. The plant community is Utah juniper and pinyon pine. Plants within this community include Salina wildrye, western wheatgrass, and Indian ricegrass.

#### Soils have been described in the MRP as either

- Typic Ustochrepts (50%) which are characterized by a 35 cm thick (13 inches) sandy loam surface layer with 25% coarse fragments. Underlying this layer is a stony loam layer 100 cm thick (39 inches) with up to 50% coarse fragments.
- or
- Lithic Ustorthents (25%) which are characterized by rock within 50 cm or 19 inches.

Also present are small areas of Mollisols on the north and east facing slopes. In general, Mollisols are deep, well drained, with a well developed A horizon. See the General Soil Map of the Permit Area, Drawing #CE-10502-DS.

Soil and Refuse sample sites are shown Drawing CS1814D. The following samples have been taken of the soils outside of the disturbed area boundary and represent undisturbed soil quality: SS5A, SS7A, SS8A, SS10A collected in 1990 and SS1, SS3, SS10 collected in 2001. Laboratory Data Sheets for these sites are found in Appendix A. The 1990 soil samples were collected by Val Payne in April 1990 and analyzed by ACZ Laboratories in Steamboat Springs, CO. The 2001 samples were collected by Dennis Oakley and Chuck Semborski in March 1990 and analyzed by Inter-Mountain Laboratories in Sheridan, WY.

Sample depths were not reported for the 1990 samples and profile descriptions are not available. Two samples taken by Mr. Val Payne, SS6A and SS9A could not be located on Plate CS1814D and therefore were not included in the following discussion. Generally, the undisturbed soils have pH values between 7.3 and 7.6; Electrical Conductivities (EC) between 0.42 and 1.06 mmhos/cm; Sodium Adsorption Ratios (SAR) between 0.2 and 1.7; Nitrate Nitrogen between 1.1 to 3.5 ppm; Extractable Phosphorus between 1 and 2 ppm; Neutralization Potentials between 16 and 18 % CaCO<sub>3</sub> ; Texture of sandy loam or loam with the sand content

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varying from 49 to 54%; and Saturation percent of 30 to 39%. Soils in the location of SS10A were found to have much less sand (23%) than the other sites with texture bordering on clay loam (27% clay and 50% silt). As expected, this site had the highest saturation percentage. Coarse fragments (greater than 2mm) in the soils were 35 to 40%.

In 2001, samples were taken of undisturbed soils to a depth of 18 inches and samples were analyzed from 0 – 6 inches, 6 – 12 inches and 12 – 18 inch depths. No field notes were taken and it is not known whether a lithic contact was encountered at eighteen inches. The undisturbed soil sample sites (SS1, SS3, and SS10) were generally in the same physio-chemical parameters described for the 1990 soils above. With the soils in the vicinity of SS10 again exhibiting higher clay contents and higher saturation percentage. Electrical Conductivity at site SS1 and SS3 were noticeably higher than 1990 sampling, values over 2.0 mmhos/cm were recorded. SAR values remained below 1.0 with some noticeable increase in SAR with depth (from 0.24 to 0.96 at SS1). Phosphorus levels at SS 1 and SS 10 were over 3 ppm in the top six inches, similar to earlier sampling. Phosphorus levels at SS 3 were 0.41 ppm in the top six inches, much less than other sites.

A soil survey of the Des Bee Dove mine site by Dr. A.R. Southard, Soil Scientist, Utah State University is referred to in this amendment. A portion of the Southard soil survey is found in Appendix B of Chapter 2. Missing is the Appendix containing details of soils analyses as referred to in the Overview of the survey. **In the introductory comments, Dr. Southard points out that the disturbed mine soils may be suitable for use as growth medium for selected plant species with the aide of terracing and irrigation. Dr. Southard cautioned the Permittee about “hot spots” or areas that have high SAR or acidity.**

Drawing CS1814D shows locations Dr. Southard's soil sampling. Sample sites 1107, and 1110 were collected from pre-SMCRA fill slopes in 1980 and 1983 (Table 1 of Section 200). The pre-SMCRA fill slope was sampled from 0 - 4, 4 - 12, and 12 - 24 inches in depth. The soils are sandy loam in texture with a pH of 8.0 to 8.3. The EC's and SAR were both less than 1.0. Except the subsoil in the wash (sample 1111, depth unknown) where the EC was 2.1 and the SAR was 1.0. Calculation of SAR on these samples is questionable since the sodium is reported in meq/L and the Ca + Mg is reported as a percentage.

**Findings:**

Information in the proposed amendment is adequate to meet the environmental soil resource reporting requirements of the Regulations.

## OPERATION PLAN

### TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

#### Analysis:

##### Topsoil Substitutes and Supplements

Recent sampling of the disturbed area included sites SS7, SS7A, SS7B, SS8, and SS9. These samples were bagged at six inch intervals to a depth of 18 inches by Dennis Oakley and Chuck Semborski and analyzed by Intermountain Laboratories of Sheridan WY in March through May of 2001 (Table 3 and laboratory analyses are attached at the end of Section 200). Soils from sample area SS8 are among the best available and are proposed as a source of substitute topsoil for Phase I and would generate 1,065 cubic yards if a depth of three feet is harvested from the 0.22 acre outslope. Soils at SS9 will be utilized to reclaim the access road. Soils from SS7, SS7A and SS7B will be pushed against the cut slope.

The soil represented by SS8 was successfully reclaimed by an interim seeding in 1988. The SS8 soil has a pH of 7.3 and very low EC between 0.55 and 0.88. The SAR ranges between 0.86 and 0.95. The texture is a loam with between 45 and 55% sand. The Saturation Percent is between 29 and 32%. Total Organic Carbon is less than 14% and falls with depth. Phosphorus is between 2 and 3 ppm. Boron levels are between 1.4 and 1.8 ppm. Plans are to salvage all available topsoil from the Little Dove/Beehive outslope to a depth of three feet. Potentially amassing 1,065 cubic yards of substitute topsoil.

Results of sampling at SS7, were discouraging due to the SAR value over 6 in the top six inches, combined with a percent sand of 62% both of which would lower the available water holding capacity. (Saturation percent was 21 to 31%.) Nitrogen, phosphorus and Total Organic Carbon were all elevated suggesting that this soil sample was mixed with refuse.

Re-sampling at sites SS7A and SS7B, dispelled this worry as SAR values to a depth of eighteen inches were less than 2.0. At sites SS7A and SS7B the texture was very different, much less sand was reported (27 - 37%). Silt content (38 - 48%) and clay content (22 - 26%) increased to make a soil that has a loam texture with a Saturation Percentage between 30 and 37%. The pH is near neutral between 6.9 and 7.3. Less sandy soil is preferable for use as substitute topsoil.

Soils along the access road are represented by SS9. Here the pH is a uniform 7.1 and EC rises from 1.96 to 3.02 mmhos/cm with depth. The SAR climbs from 0.81 to 1.76 with depth. The soil has a loam texture with sand decreasing from 51 to 35% with depth. Saturation percent is 34 - 35%. Total organic carbon values are over 25% in the top foot and drop to 14% below twelve inches. Phosphorus is between 0.6 and 0.8 ppm. Interestingly, Boron is elevated over

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background levels (about five times) and is between 1.4 to 1.7 ppm. Even at these levels, Boron is not a cause for concern. This soil will be suitable for use as substitute topsoil.

In addition, four trenches (T1, T1A, T2, T2A and T3) were dug in December 2001 to evaluate the Phase I soils. The quality of the soils in these trenches is described in Appendix C Substitute Topsoil Assessment, (E.I.S. 2002). Trench locations are shown on Drawing CM-10336-DS. Soil Descriptions are located in Exhibit A of Appendix C. Laboratory testing of composite samples of the soils is provided in Exhibit B of Appendix C. Phase I soils are represented by the following six samples: DBB 10601, DBD10701, DBD10801, DBD11001, DBD11101, and DBD11301.

**In a discussion of the information provided in Appendix C and its Exhibits, Mr. Dan Larsen (consulting Soil Scientist with E.I.S. Environmental Engineering) recommends that the most suitable soil for the Phase I area is the "the upper 36 inches on the outslope near the Beehive Mine (T2A); some of the surface soil at the Little Dove and Beehive mine pad; colluvial fill material at the Little Dove and Beehive mine site (T1A, T2A)" (Appendix C Substitute Topsoil Assessment, page 11). Mr. Larsen further states on page 11 that "Any variegated clayey material of reddish and yellowish colors such as noted at the Little Dove mine pad site (T1, sample DBD10801) should be buried and not allowed to be used as surface (topsoil) material due to physical and chemical characteristics." Mr. Larsen specified that the mix of coal and soil represented in Trench T1 by sample DBD110701 (15-28 inch depth) is unsuitable due to Total Organic Carbon content (16%).**

### **Removal and Storage**

Based upon a six inch cover depth of the 2.13 acre Phase I reclamation area, maximum volume of substitute topsoil required is reported as 2,100 cubic yards (Chapter 2, Soil Trenching and Management Plan, Phase 1 and 2 Estimated Soil Distribution Acreage table).

The outslope of the Little Dove/Beehive pad will be excavated down to three feet to provide a stockpile of substitute topsoil (potentially amounting to 1,065 cubic yards) for use either in Phase I or Phase II. Use of the substitute topsoil in Phase I area will depend upon the quality of the subsoils unearthed at the Phase I site during reconstruction of the slopes and drainages.

Protection of stockpiled topsoil was not specifically mentioned in this submittal. The Permittee will be held to the performance standard of protection of topsoil stockpiles as described in the MRP.

The remaining outslope subsoils will be excavated to bedrock and the material will be used for final slope construction ((Chapter 2, Soil Trenching and Management Plan, Itemized sequences of soil management and slope construction). Mr. Dan Larsen, Soil Scientist with E.I.S. Environmental and Engineering Consulting, reports that the soil in the fill of the out slopes is marginally suitable. The submittal indicates that the Permittee will consult with the Division as to whether to utilize the stockpiled substitute topsoil as cover over the subsoils or save the stockpiled soil for use at the Phase II (AM01D) site. Final placement of the substitute topsoil

would be dependent upon the quality of the unearthed subsoil.

### **Findings:**

Information in the proposed amendment is adequate to meet the operational topsoil and subsoil requirements of the Regulations. Protection of stockpiled topsoil was not specifically mentioned in this submittal. **The Permittee will be held to the performance standard of protection afforded to topsoil stockpiles as described in the MRP for existing topsoil stockpiles at the sediment pond of the Des Bee Dove Mine site.**

## **RECLAMATION PLAN**

### **GENERAL REQUIREMENTS**

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

### **Analysis:**

#### **Phase I:**

- The Little Dove/Beehive pad (2.13 acres) will require 15,000 cubic yards of backfill (Section 240 Reclamation Plan - Portal Pad Area).
- The substation and water storage area (0.75 acres) will require 2,500 cubic yards of backfill (Section 240 Reclamation Plan - Substation and Water Storage Area).
- The access road down to the Desert pad (0.97 acres) will require 3,000 cubic yards of backfill (Section 240 Reclamation Plan - Access Road).

Together, these three areas of Phase I will require 2,100 cubic yards of substitute topsoil ((Chapter 2, Soil Trenching and Management Plan, Phase 1 and 2 Estimated Soil Distribution Acreage table), based upon a six inch replacement depth and all slopes equal to or less steep than 2h:1v.

All slopes will be created between 1.5h:1v and 2h:1v. Substitute topsoil will be graded over slopes of 2h:1v. Slopes greater than 2h:1v will have isolated pockets of soil placed in the rock slope, as required by the R, B, &G Engineering Inc, Slope Stability Report dated September 2001 (Section 540, Appendix C).

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**Findings:**

The information provided is adequate for the general description requirement of the regulations.

**TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

**Analysis:**

**Redistribution**

The outslope of the Little Dove/Beehive pad will be excavated down to three feet to provide a stockpile of substitute topsoil (potentially amounting to 1,065 cubic yards) for use either in Phase I or Phase II. Use of the substitute topsoil in Phase I area will depend upon the quality of the subsoils unearthed at the Phase I site during reconstruction of the slopes and drainages.

**Findings:**

Information in the proposed amendment is adequate to meet the Reclamation topsoil/subsoil requirements of the Regulations.

**HYDROLOGIC INFORMATION**

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

**Analysis:**

**Acid and toxic-forming materials**

The Southard Soils report provided in Appendix B indicates that some of the spoils are rich in pyrite (16% pyrite). Soil testing indicates that variegated red/gray clayey soils noted at the Little Dove mine pad site (T1, sample DBD10801) should be buried and not allowed to be used as surface (topsoil) material due to physical and chemical characteristics (Table 1, Appendix C Substitute Topsoil Assessment, pages 5 and 10). The limiting chemical characteristics of this red/gray soil is extremely low carbonate content (1.4%) which translates into limited buffering capacity (-16 Total Sulfur Acid Base Potential and 12 Pyritic Sulfur Acid Base Potential). The clay loam texture (36% clay) is also undesirable.



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Soils in Trench T3 along the access road were also described as being unsuitable for use although they were not sent for laboratory testing. However, soils along the access road were tested in March of 2001 (sample SS9). SS9 soils are described earlier in this Technical Analysis under Operations Topsoil and Subsoil. The Division's conclusion as a result of the March 2001 testing was that SS9 soil is suitable for use as substitute topsoil.

Straight coal refuse was not sampled from the Phase I site. A mix of coal, gravel and soil was sampled and is represented by DBD 10701 (Table 1 and Exhibit B of Appendix C). This material is not toxic or acid forming, but is not suitable as surface material due to the 16% TOC.

**Findings:**

Information in the proposed amendment is adequate to meet acid/toxic reclamation requirements of the Regulations.

**RECOMMENDATIONS:**

Protection of stockpiled topsoil was not specifically mentioned in this submittal. The Permittee will be held to the performance standard of protection afforded to topsoil stockpiles as described in the MRP for existing topsoil stockpiles at the sediment pond of the Des Bee Dove Mine site.